



# REQ18/WEQ19 Maintenance Update

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~~Monday, January 30, 2012~~ ~~Friday, January 27, 2012~~ ~~09:45:00~~ ~~17:10:00~~

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## 1 Overview

This white paper was written at the request of the NAESB REQ.18/WEQ.19 committee to review possible updates to the NAESB standard based on lessons learned in its first applications during the calendar year 2011. It is designed to present the scope and nature of the changes suggested for consideration by the committee and thereby to kick off a maintenance update of the standard.

The NAESB REQ18/WEQ19 evolved starting from a collaboration of modelers from the IEC TC57 committee's IEC61968 Part 9, UCAIug's OpenADE, ZigBee Smart Energy Profile, and the EIS Alliance. The resulting model was intended to be a union of requirements from these sources, as well as, those understood by the participants. Through the NAESB process, these models and requirements were matured to result in the NAESB PAP10 Energy Usage Information Standard REQ.18/WEQ.19.

The official published version of the CIM standard IEC61968 Part 9, which contains its metering model, is significantly different than the emerging draft for edition 2 that will be shortly put out for review. These changes occurred over about a one year period which bracketed the SEP2.0 work and the NAESB PAP10 work. Both NAESB and SEP2.0 (in two different iterations) synched up with the TC57 activity at different draft stages. This caused them to differ in small but meaningful ways.

It is valuable to synch-up the three efforts on these details. However, it will also be important to maintain the additional semantics required by the NAESB standard. These will continue to be documented as careful extensions to the CIM base.

Additionally, the ASHRAE/NEMA led SPC201P effort at completing the semantic modeling picture from the facility perspective has made some valuable small enhancements to the NAESB model which they embraced. These consist principally of the addition of some enumerated values of existing attributes. Finally, the NAESB REQ21 Energy Services Provider Interface standard, has also worked to embrace many of the evolutionary changes to CIM/SEP into their capture of the EUI model.

Therefore, we would like to recommend that we embark on a maintenance update of the REQ18/WEQ19 standard to minimally do the following:

- 1) Revise ReadingType to use the revised and added attributes from CIM 61968-9. No deletions of attributes should occur – only additions, renaming, and extension of enumerations lists.
- 2) Incorporate SPC201's enumeration enhancements
- 3) Correct minor defects in modeling data structures observed since first publication.

The intent of this activity is to solely address these topics without need to alter the Principles or Model Business Practices of the standard. Note that there is no proposed change that will result in a loss of capability of the PAP10 EUI model. Correspondingly there are no proposed extensions of the capabilities of the model.

## 2 Change Details

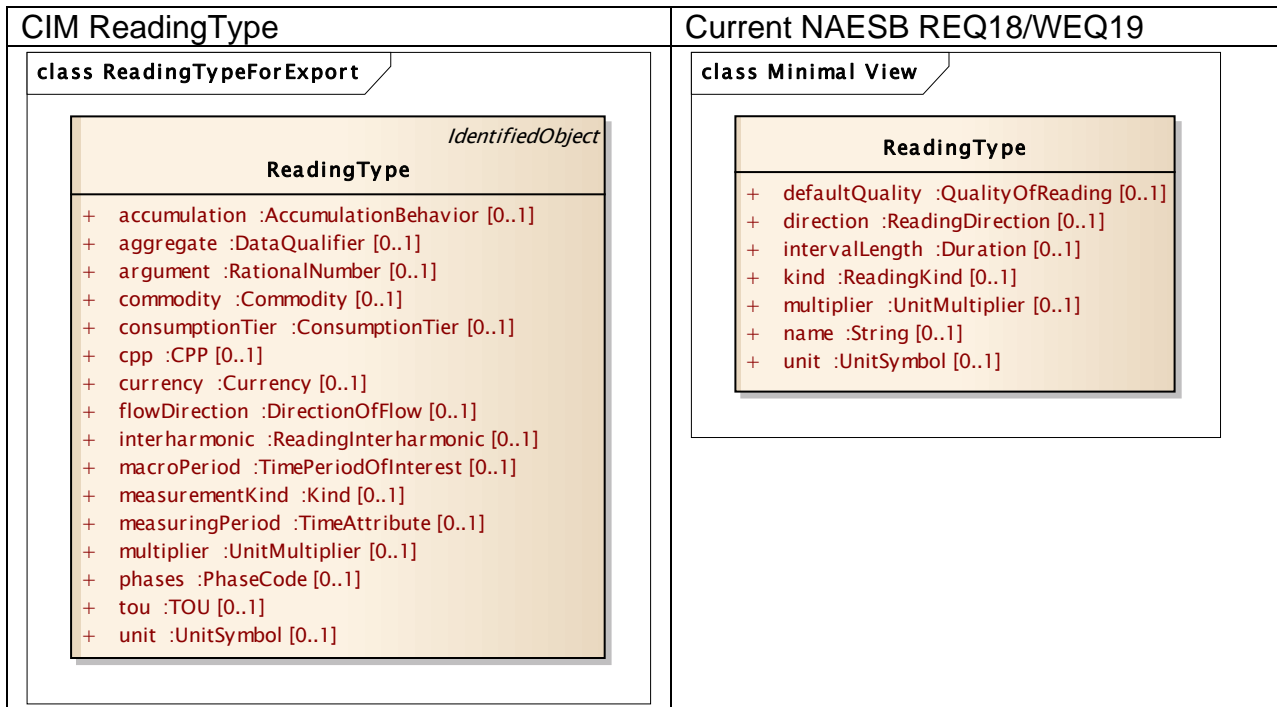
The following summarizes the changes recommended by this white paper.

### 2.1 ReadingType

The most significant change is the extension of attributes that are metadata about a measurement in the ReadingType class. Some elements of the original ReadingType have been renamed as well. The following table from REQ21 summarizes these changes:

PAP10 EUI Model Element	Type	ESPI Model Element	Type	CIM Notes
ReadingType.name	String	ReadingType.entry.id	URN	Same
		ReadingType.entry.title	String	Same
ReadingType.defaultQuality	QualityOfReading	ReadingType.defaultQuality	QualityOfReading	Recommended extension
ReadingType.direction	ReadingDirection	ReadingType.flowDirection	FlowDirectionType	Same
ReadingType.intervalLength	Duration	ReadingType.intervalLength	UInt32	Recommended extension
ReadingType.kind	ReadingKind	ReadingType.kind	KindType	measurementKind
ReadingType.multiplier	UnitMultiplier	ReadingType.powerOfTenMultiplier	PowerOfTenMultiplierType	Recommended extension
ReadingType.unit	UnitSymbol	ReadingType.uom	UomType	unit
		ReadingType.accumulationBehaviour	AccumulationBehaviourType	accumulation
		ReadingType.dataQualifier	DataQualifierType	Recommended extension
		ReadingType.tou	TOUType	Same
		ReadingType.currency	CurrencyCode	Same
		ReadingType.commodity	CommodityType	Same
		ReadingType.consumptionTier	ConsumptionTierType	Same
		ReadingType.phase	PhaseCode	phases

Below is a graphic showing the two UML models side by side. The new NAESB ReadingType will merge the new/revised CIM attributes with the contents of the current class:



### 2.2 Added enumerated values from Facility Smart Grid Information Model (FSGIM)

The enumeration “Commodity” in the new ReadingType contains the list of commodities for whose measurements can be represented. ASHRAE SPC201P Facility Smart Grid Information Model is a companion to the REQ18/WEQ19 that fleshes out the additional requirements needed to represent the facility side view of the Smart Grid.

Additional measurements related to EPA recognized pollutants [\[“recognized pollutants” does not appear to be a technical EPA term. What exactly is meant by this term?\]](#) were added to allow representations of these measurements to be made. Based on the figure below [\[What are the criteria for inclusion on this list?\]](#), the following enumerated values need to be added:

CO, CO2e [\[CO2e is not a “pollutant” but a value or measurement of the global warming potential of a given greenhouse gas, so should this element be characterized in a different fashion?\]](#), lead, otherContaminants, ozone, PM10, PM2.5, sox

FSGIM Required Pollutants	Current CIM/Proposed NAESB List
<div> <pre> class EmissionsInformation {     EmissionsProfile     + CO :Float     + CO2 :Float     + CO2e :Float [0..1]     + HCH :Float     + lead :Float     + mercury :Float     + methane :Float     + NOx :Float     + otherContaminants :Name-Value-UnitExtension [0..*]     + ozone :Float     + perfluorocarbons :Float     + perWhat :MeasuredQuantity     + PM10 :Float     + PM2.5 :Float     + SO2 :Float     + SOx :Float     + sulfur hexafluoride :Float }                     </pre> </div> <p><a href="#">[What does “HCH” refer to on both of these lists? We know that HCH can refer to hexachlorocyclohexane (related to pesticides) but do not believe that is what is intended here.]</a></p> <p><a href="#">[In addition, adding some examples/use-cases/descriptions of these items may be beneficial.]</a></p>	<div> <pre> «enumeration» NewEnumerations::Commodity none = 0 electricity SecondaryMetered = 1 electricity PrimaryMetered = 2 communication = 3 air = 4 insulativeGas = 5 insulativeOil = 6 naturalGas = 7 propane = 8 potableWater = 9 steam = 10 wasteWater = 11 heatingFluid = 12 coolingFluid = 13 nonpotableWater = 14 nox = 15 so2 = 16 ch4 = 17 co2 = 18 carbon = 19 hch = 20 pfc = 21 sf6 = 22 tvLicence = 23 internet = 24 refuse = 25                     </pre> </div>

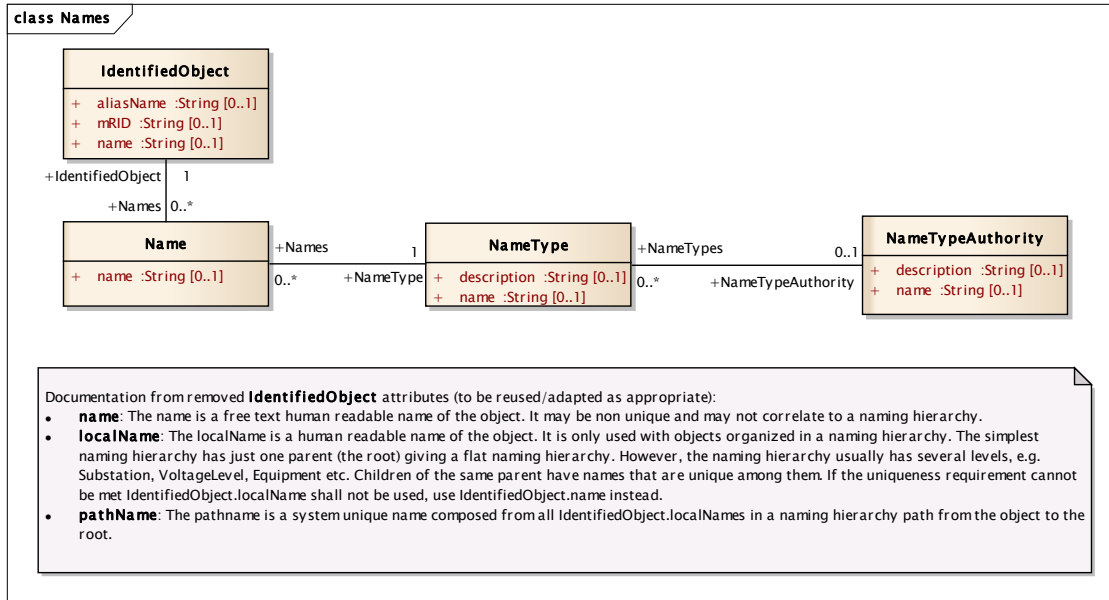
### 2.3 Identified Object

Object identification is a critical modeling semantic common to all modeling efforts. The ObjectID class is the base class from which all major classes inherit in CIM (from which

UsagePoint and other EUI classes originate). This was an important but simple omission from the original EUI model.

The UsagePoint, ReadingType, IntervalBlock, MeterReading, ElectricPowerUsageSummary, ElectricPowerQualitySummary, and Authorization should inherit from IdentifiedObject.

IdentifiedObject should contain the CIM model of IdentifiedObject as follows:



## 2.4 ElectricPowerUsageSummary.flickerPst should be float

The flickerPst component of the ElectricPowerUsageSummary is a measure of stability of the power as observed over a period of time. The initial contribution to REQ18/WEQ19 errantly defined this as a count of some observable event. This was detected as an error and has since been corrected in ESPI as well as OASIS EMIX which uses the same data structure.

Current type and definition:

Integer: A count of Rapid Voltage Change events during the summary interval period

Proposed type and definition

Float: flickerPst is a value measured over 10 minutes that characterizes the likelihood that the voltage fluctuations would result in perceptible light flicker. A value of 1.0 is designed to represent the level that 50% of people would perceive flicker in a 60 watt incandescent bulb.

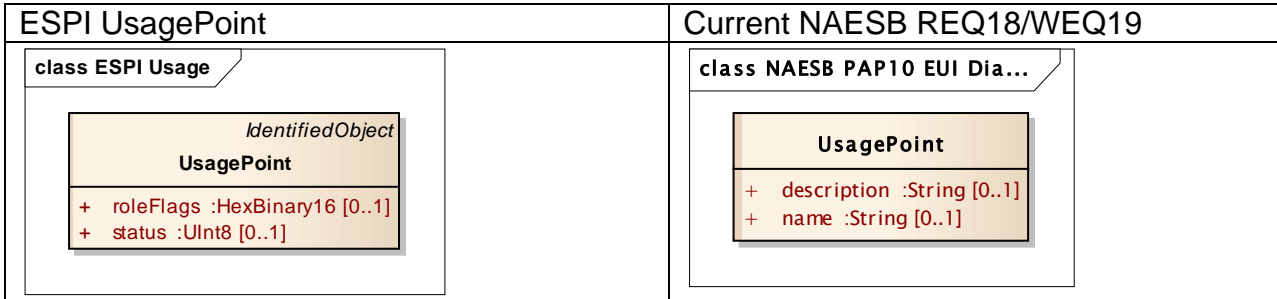
## 2.5 currentBillingPeriodOverAllConsumption vs. currentBillingPeriodOverallConsumption

This is a simple name change since the capitalization looks incorrect. Overall is one word, yet it is “camelCased” as two.

## 2.6 UsagePoint.roleFlags and UsagePoint.status from ESPI/SEP2.0

To maintain semantic alignment with ESPI and SEP2.0, these two attributes should be added to the UsagePoint class. Note that the “name” attribute of UsagePoint will be redundant with

the inheritance from IdentifiedObject and should be removed in favor of IdentifiedObject modification.

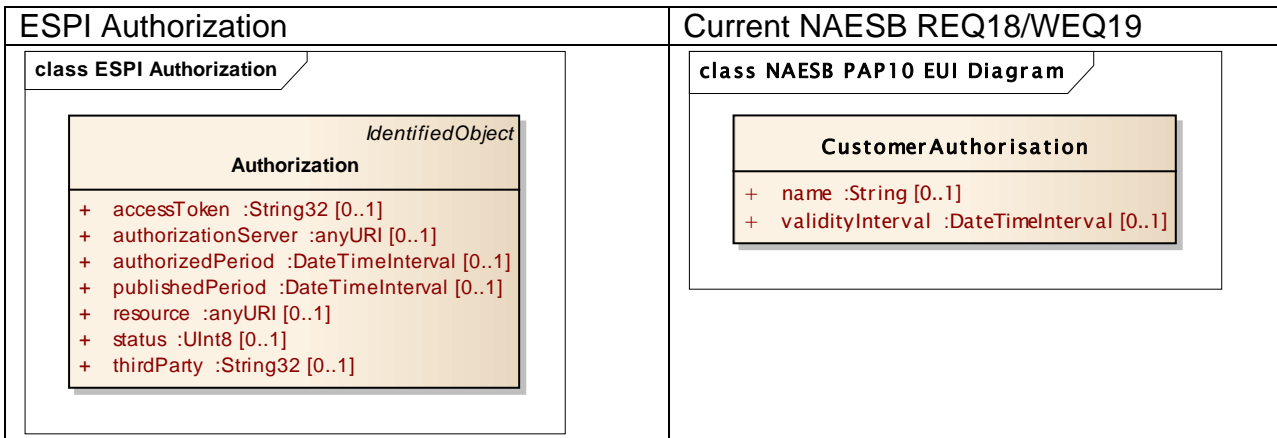


### 2.7 ServiceCategory should associate with UsagePoint, not ServiceDeliveryPoint

To maintain semantic alignment with SEP2.0, this association should be moved. This association originally came from the OpenADE requirements and early versions of SEP 2.0. This simple modification eliminates the requirement for ServiceDeliveryPoint if ServiceCategory is desired.

### 2.8 Authorization from ESPI

The CustomerAuthorization class came from the OpenADE contributions. As this work flowed into the ESPI standard, REQ.21 a more fleshed out class was needed. This proposed revision would revise the CustomerAuthorization class to be the contents of the ESPI Authorization class. The impact would be additional and revised attributes with no loss of expressiveness.



### 2.9 Cost vs LineDetail in Usage Summary

Currently, the costAdditionalLastPeriod is a single value of type float. Note that the cost components are optional in REQ18/WEQ19. This attribute is designed to allow all costs allocated in the IntervalReading and Reading classes to roll up to the total provided in the UsageSummary.billLastPeriod less the costAdditionalLastPeriod.

Representing cost results this way removes the need for any pricing information and model to be necessary to understand the EUI data which only renders a summary of the results of the application of a pricing model.

It is suggested that this component of the UsageSummary class be modified so that additional optional line items for this attribute can be provided.

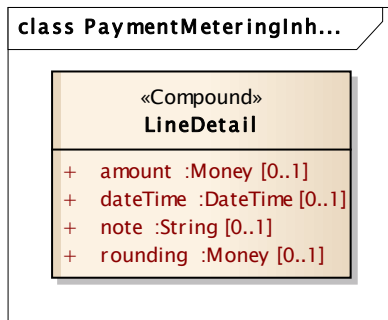
*Note: this change would differ with ESPI which has the single valued version of this attribute.*

Suggest replacing the attribute currently:

costAdditionalLastPeriod: Float [0..1]

With

costAdditionalLastPeriod: LineDetail [0..\*]



The attributes of the LineDetail class would be modified to be consistent with REQ18/WEQ19 attributes for amount, dateTime, and rounding. [\[Adding some examples/use-cases/descriptions of these items may be beneficial.\]](#)

### 3 Impact to Minimal View and Conformance

The impact of these changes to the “minimal view” and “conformance” section REQ.18.3.4.3 are small as follows:

1. One or more measurement or summary containers: IntervalReading, Reading, ElectricPowerQualitySummary, UsageSummary  
*Impact: No changes to containers listed*
2. At least two of the following attributes, for each IntervalReading: start, end, duration (from the DateTimeInterval)  
*Impact: No changes to date and time attributes*
3. The attribute “value” (the value of the measurement, from IntervalReading or Reading)  
*Impact: No changes to the value attributes*
4. ReadingType – name, defaultQuality, direction, kind, multiplier, name, unit  
*Impact: names of reading type attributes are changed and enumerated values extended. No loss of expressiveness occurs.*
5. Association to ReadingType for each measurement (IntervalReading or Reading)  
*Impact: No changes to these associations.*

6. Measurement source / location – UsagePoint.name and association to measurements or summary

*Impact: UsagePoint.name becomes an inherited attribute from IdentifiedObject but is still present. No changes to these associations.*